national accelerator laboratory

TM-317-A
0402

ADDENDUM TO TM-317

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D. Edwards pointed out that when one quadrupole is missing one can usually regain the stable betatron oscillation in both horizontal and vertical directions by simply making the next (upstream or downstream) quadrupole inactive. This has been confirmed by numerical calculations. When two normal quadrupoles are missing together, tunes are 20.17 (horizontal) and 20.24 (vertical); modified values of β are 400~420 (horizontal) and 380~400 (vertical). This would be better than changing the strength of all quadrupoles by the same amount when one cannot control B_F' and B_D' separately.

It should be emphasized here that, whatever remedies are employed, the condition at the injection point is quite different from the normal case so that the transport system has to be retuned, not an easy task since there are six parameters to be adjusted (β_x, α_x, β_y, α_y, and two dispersion parameters). For example, if the transport system is not readjusted, the mismatching will double the beam size and the entire effect (mismatching and the increase of β) is to increase the beam size four times.

I am grateful to D. Edwards for his suggestions.